Micro Vickers Hardness Testing Machines

HM-200

Catalog No. E4308-352/353

Micro-Vickers hardness testing machines have been released from limitations on test force.
The latest electromagnetic force motor employed in the loading mechanism enables arbitrary test forces to be set, greatly widening the choice of test conditions.

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HM200

Features

Electromagnetic force motor employed in the loading mechanism

The latest electromagnetic force motor used in the loading mechanism has enabled the test force to be freely selected (see test force specifications over the wide range of 0.4903mN (0.05gf) to 19610mN (2kgf). It is also possible to freely set the time for loading and load dwell time. Now your desire for absolute control over the indentation size in hardness testing can be satisfied. The HM-200 series always offers the test force most appropriate for the specimen material and shape.

Note: Hardness values may vary with the setting of test force depending on the material and surface finish of the specimen.

Equipped with a fracture toughness evaluation function for ceramics

It is possible to perform not only the Vickers hardness test but also a fracture toughness test (IF test: JIS R 1607-1995) on ceramics.

3. Automatic turret mechanism (manual operation possible)

Automatic switching is possible between the indenter and the objectives.
Objective: Up to four objectives can be installed.
Standard objectives: 10X, 50X (HM-211)
10X, 50X, 100X (HM-221)
Indenter shaft unit: Up to two shafts can be installed
Standard indenter: Vickers indenter (1 pc.) (HM-211, HM-221)

1. Measuring microscope (digital type)

2. Illumination unit

7. Optical path for camera

5. XY stage (digital type)

Table top size: 100x100mm
Travel range: 25x25mm
Provided with digital micrometer head (standard accessory).

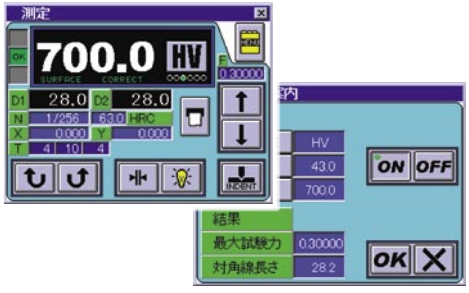
8. Optical path selector

4. Vise

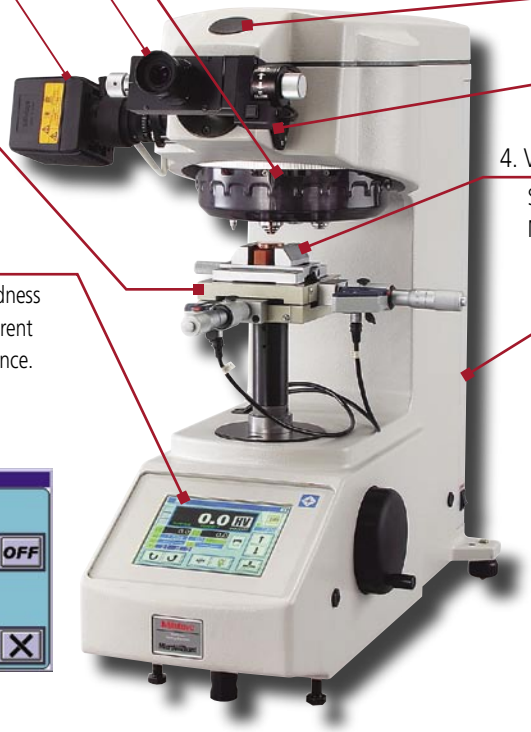
Standard vise (standard accessory)
Maximum jaw opening: 51mm

6. Touch screen type control panel

You can not only follow the basic steps of hardness testing but also see the hardness value in different hardness scales and testing conditions at a glance.



9. Rear panel



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Long working distance objectives

The objectives used enable a very comfortable working distance between the objective and the specimen surface. This greatly reduces the possibility of collision between the specimen and the objective during focusing operations.
(For 50X objective, a clearance of 0.4 mm in HM-100 series has been improved to increase 1.1 mm in HM-200 series.)

Built-in variable aperture stop

The contrast that is most appropriate for the magnification of the objective can be obtained by manipulating the variable aperture stop in the illumination unit. This makes the indentations clearly visible, leading less variation and reducing the chance of error when measuring the diagonal lengths.

Energy saving function

An energy saving function is incorporated that automatically turns off the control panel and illumination unit if the machine is left unattended for a significant length of time.

Specifications

Order No.		810-352▮					810-353▮									
Model No.		HM-211					HM-221									
Fixed test force	mN	98.07	196.1	294.2	490.3	980.7	0.4903	0.9807	1.961	2.942	4.903	9.807	19.61	29.42,	49.03	98.07
	gf	10	20	30	50	100	0.05	0.1	0.2	0.3	0.5	1	2	3	5	10
	mN	1961	2942	4903	9807		196.1	294.2	490.3	980.7	1961	2942	4903	9807	19610	
	gf	200	300	500	1000		20	30	50	100	200	300	500	1000	2000	
Arbitrary test force (One type of setting can be saved.)		Test force of 980.7mN (100gf) or less can be set in increments of 9.807mN (1gf).					Only the test force of 0.4903mN (0.05gf) is available below 0.9807mN (0.1gf).									
							Test force of 0.9807mN (0.1gf) or more and below 9.807mN (1gf) can be set in increments of 0.9807mN (0.1gf).									
		Test force of 980.7mN (100gf) or more can be set in increments of 98.07mN (10gf).					Test force of 9.807mN (1gf) or more and below 980.7mN (100gf) can be set in increments of 9.807mN (1gf).									
							Test force of 980.7mN (100gf) or more can be set in increments of 98.07mN (10gf).									
Test force control		Force generation by electromagnetic and automatic control (load, dwell, unload)														
Test force dwell time		Possible to set in increments of 1 sec between 0 and 999 sec.														
Specimen size		133 mm in height, 160 mm in depth (as measured from the indenter shaft)														
Optical performance		Infinity corrected optical system, light source halogen bulb, variable aperture stop, fixed field stop, measuring microscope/camera optical path switching system														
Objectives		10X for measurement, 50X for measurement, up to four objectives can be mounted					10X for measurement, 50X for measurement, 100X for measurement, up to four objectives can be mounted.									
Maximum measurable length		Objective: 10X: 700µm, 50X:140µm					Objective 10X: 700µm, 50X: 140µm,100X: 70µm									
Turret switching		Motor driven (manual selector is also possible)														
XY stage		With digital micrometer heads/table top size: 100x100 mm/travel range: 25(X)x25(Y) mm/ resolution: 1µm														
Data display function		Display on the LCD color touch panel														
		The length of the diagonal of indentation: 5-digit maximum, minimum of 0.01µm (for objectives of 50X or over) hardness value: 4-digit maximum, minimum hardness of 0.1														
		Load, dwell, unload, GO/NG judgment (OK/±NG), converted hardness, indenter (HV/HK), XY table position														
Compensation function		Cylindrical compensation, spherical compensation, reading compensation														
Hardness conversion function		Selectable from SAE/ASTM/BSi860/DIN/Mitutoyo														
Test conditions guiding function		Calculates test force from the expected indentation depth (thickness of specimen) and the expected hardness														
Statistical calculation function		Number														
		Standard deviation (n-1), Standard deviation (n)														
Output		Digimatic: 1CH, Centronics: 1CH, RS232C: 1CH														
External dimensions		External dimensions: Approx. 400(W) x 625(D) x 600(H) mm, Installation space: Approx. 600(W) x 780(D) x 1000(H) mm or over														
Mass		Approx. 43 kg														
Power supply		100-120V AC, 50/60Hz, 90VA														

▮: Suffix A for 110V, C for 100V, D for 220/230V, E for 240V, DC for China, K for Korea or non for 100V

Standard Accessories

Order No.	Item name	Description	Quantity
19BAA407	Measuring microscope	Digital type, eyepiece 10X	1 *1
810-817	Objective	10X, for measurement, W.D. 5.6mm, with spacer washer: standard for HM-211/221	1 *2
19BAA439	Objective	50X, for measurement, W.D. 1.1 mm, with spacer washer: standard for HM-211/221	1 *2
19BAA440	Objective	100X, for measurement, W.D. 2.5mm, with spacer washer: standard for HM-221	1 *2
19BAA058	Diamond indenter	Vickers Liner provided: for HM-211	1 *3
19BAA059	Diamond indenter	Vickers (for low test force) Liner provided: for HM-211	
11BAA578	Extension shaft	For elevation shaft 38mm with two setscrews	1
02DEA204	Extension shaft	For elevation shaft 76mm with two setscrews	1 *1
810-074	XY stage (digital type)	100 x 100mm, Stroke: 25(X) x 25(Y)mm	1 *1
19BAA133	Spacer (specimen stage)	Material: bakelite, 11(W)x13(H)x42(D)mm	1
810-016	Standard vise	Jaw opening: 51mm	1
—	Vise setscrew	M5 x 8mm	4
938905	Optical filter	Green	1 *1
11BAA961	Rubber hood	For eyepiece	1 *1
19BAA522	Camera mount adapter		1
—	Leveling screw		2 *1
02ZAA000	Power cable set-PSE	Classification: No marking 125V AC/7A/1.8M	1 *4
02DEA471	Dust cover		1
—	Hardness test block	700HMV0.3, 25mm(dia.) x 6mm(thickness)	1
—	Plastic Phillips screwdriver	No.1300 Phillips 2x100	1
—	Precision flathead screwdriver	No.205, Flathead 1.2	1
—	Hex-head screwdriver	Sub-tense: 1.5mm	1
—	Hex-head screwdriver	Sub-tense: 2.0mm	2
—	Hexagonal wrench	Sub-tense: 2.5mm	1
—	Hexagonal wrench	Sub-tense: 3.0mm	1
—	Hexagonal wrench	Sub-tense: 4.0mm	1
510434	Holder (carrying handle)	Dia.20 x 100	4
512926	Cap	No.2, Blanking the mounting hole of the carrying handle	4 *1
938882	Silver oxide cell	SR44 1.5V 06-06	2
—	Accessory container box		1
99MBG068	User's Manual		— *4
—	Certificate of hardness test block		1
—	Test certificate		— *4
—	Halogen bulb illuminator house		1 *1
19BAA207	Halogen bulb	12V 50W NA57901 KLV Make	1 *1
11BAB908	Fuse	For 100-120V AC, 250V AC, 2A (one unit installed)	2 *1, *2

*1 is mounted on the main unit during on-site installation.
*2 is provided with a factory-set spacer of an appropriate size when shipping.
*3 is provided with one unit according to the model as installed in the main unit.
*4 vary with the destination.

For the main unit of the hardness tester

Order No.	Item name	Description
19BAA061	Diamond indenter	Knoop, provided with the liner for HM-211 *1
19BAA062	Diamond indenter	Knoop (low test force), provided with the liner for HM-222 *1
19BAA001	Hardness test block	100HMV (Test force 9.807N, 980.7mN, 98.07mN)
19BAA002	Hardness test block	200HMV (Test force 9.807N, 980.7mN, 98.07mN)
19BAA003	Hardness test block	300HMV (Test force 9.807N, 980.7mN, 98.07mN)
19BAA004	Hardness test block	400HMV (Test force 9.807N, 980.7mN, 98.07mN)
19BAA005	Hardness test block	500HMV (Test force 9.807N, 980.7mN, 98.07mN)
19BAA006	Hardness test block	600HMV (Test force 9.807N, 980.7mN, 98.07mN)
19BAA007	Hardness test block	700HMV (Test force 9.807N, 980.7mN, 98.07mN)
19BAA008	Hardness test block	800HMV (Test force 9.807N, 980.7mN, 98.07mN)
19BAA009	Hardness test block	900HMV (Test force 9.807N, 980.7mN, 98.07mN)
19BAA010	Hardness test block	40HMV (Test force 9.807N, 980.7mN, 98.07mN)
810-017	Special vise	Jaw opening: 100mm
810-013	Specimen (thin plate) holder	Thickness: within 5mm
810-014	Specimen (wire) holder (horizontal type)	Diameter: 0.4 – 3mm
810-015	Specimen (wire) holder (vertical type)	Diameter: 0.4 – 4mm
810-019	Specimen tilting holder	Jaw opening: 37mm, Tilting angle: ±15°, Rotating angle: ±25°
810-020	Universal specimen holder	Thickness: within 30 mm
810-018	Rotary table	Minimum reading: 1°
810-084	Rotatable universal specimen holder	Height : within 32mm, Width dia: within 38mm
810-085	Adjustable specimen (thin plate) holder	Thickness: within 3mm, Width: within 56mm
810-095	Rotatable tilting specimen holder	Height: 20mm or more, Width dia: 15 – 55mm
19BAA523	XY stage (digital type)	50mm stroke
810-616	Objective	5X W.D.13.5mm *2
810-618	Objective	20X W.D.1.8mm *2
19BAA440	Objective	100X W.D.2.5mm *2
02DEA052	Objective holder	*3
11AAB250	Objective mirror magnification adjustment spacer (for single unit)	13-piece set from 0.8 to 2.0mm in increments of 0.1mm
11AAB355	Indenter shaft unit	For HM-211 *3
11AAB356	Indenter shaft unit	For HM-221 *3

Other accessories

Order No.	Item name	Model No./Specification
810-092	Video printer	VP-1200 (Seiko make) *4
19BAA242	Connecting cable	For RS-232C (9P-9P), 2m
810-622	Printer	DPU-414 (Seiko make)
19BAA266	Connecting cable	For DPU-414, 2m
19BAA157	Roll paper	For DPU-414, 10 rolls
264-504	Digimatic Mini-processor	DP-1VR
937387	Connecting cable	For DP-1VR, 1m
09EAA082	Recording paper	For DP-1VR, 10 rolls
—	Calibration certificate	Traceability chart, Inspection certificate, Calibration certificate

*1: Test certificate for Knoop hardness will be issued only when it has been shipped with the Knoop indenter built into the machine.
*2: Items that can be mounted after the on-site installation of the machine by the service engineer authorized by Mitutoyo
*3: Factory-set option.
*4: A TV-camera unit is required when using the video printer VP-1200.

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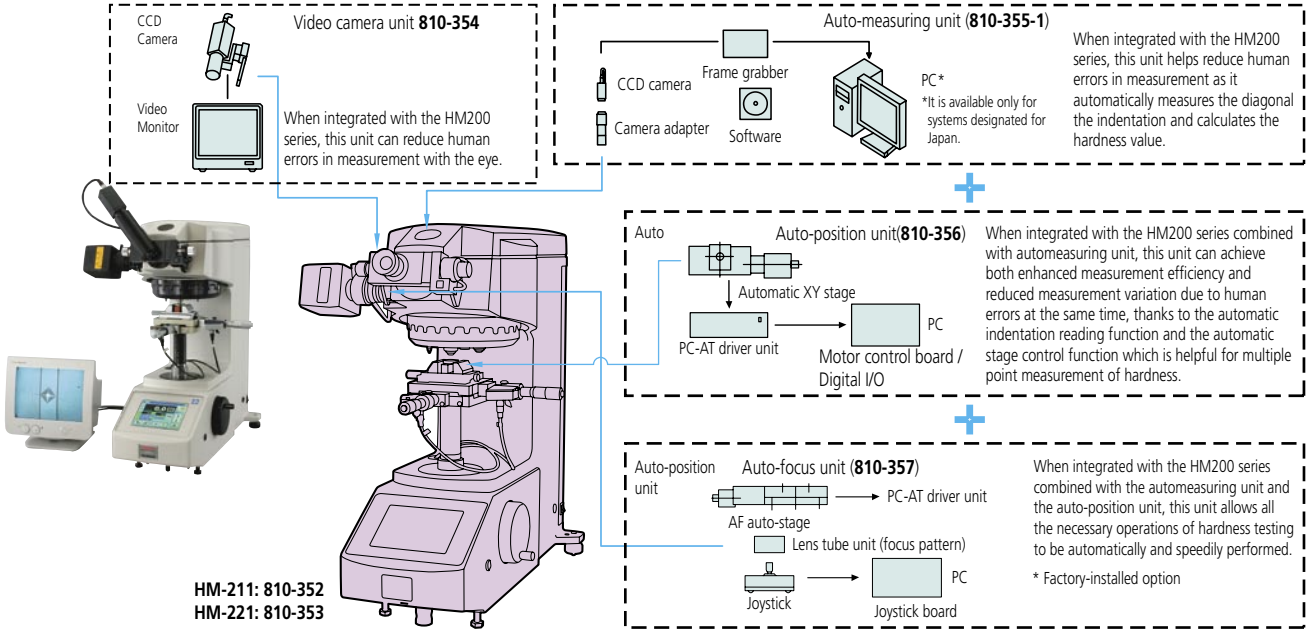
Configuration Diagram for Upgrading the System

Upgrading of the system is possible with options shown below.


CCD Camera
Video camera unit 810-354
Video Monitor
When integrated with the HM200 series, this unit can reduce human errors in measurement with the eye.
Auto-measuring unit (810-355-1)
CCD camera
Frame grabber
Camera adapter
Software
PC*
*It is available only for systems designated for Japan.
When integrated with the HM200 series, this unit helps reduce human errors in measurement as it automatically measures the diagonal the indentation and calculates the hardness value.
Auto
Auto-position unit(810-356)
Automatic XY stage
PC-AT driver unit
PC
Motor control board / Digital I/O
When integrated with the HM200 series combined with automeasuring unit, this unit can achieve both enhanced measurement efficiency and reduced measurement variation due to human errors at the same time, thanks to the automatic indentation reading function and the automatic stage control function which is helpful for multiple point measurement of hardness.
Auto-position unit
Auto-focus unit (810-357)
PC-AT driver unit
AF auto-stage
Lens tube unit (focus pattern)
Joystick
PC
Joystick board
When integrated with the HM200 series combined with the automeasuring unit and the auto-position unit, this unit allows all the necessary operations of hardness testing to be automatically and speedily performed.
* Factory-installed option
HM-211: 810-352
HM-221: 810-353

*1: When building in the video camera unit, remove the eyepiece unit of the measuring microscope (standard accessory). If the Auto-measuring unit is added, it will be exclusively used in place of the measuring microscope or video camera unit. For the exclusive use of the Auto-measuring unit or video camera unit, an optional camera power unit (Order No.19BAA360) is required. If the Auto-focus unit is added, the focus line is visible within the view field of the measuring microscope.

*2: The XY stage (digital type, standard accessory) is dismounted if the Automatic XY stage is to be used. Therefore, if the Auto-position unit is added and only the hardness tester is used, XY position data cannot be obtained.

Optional Accessories

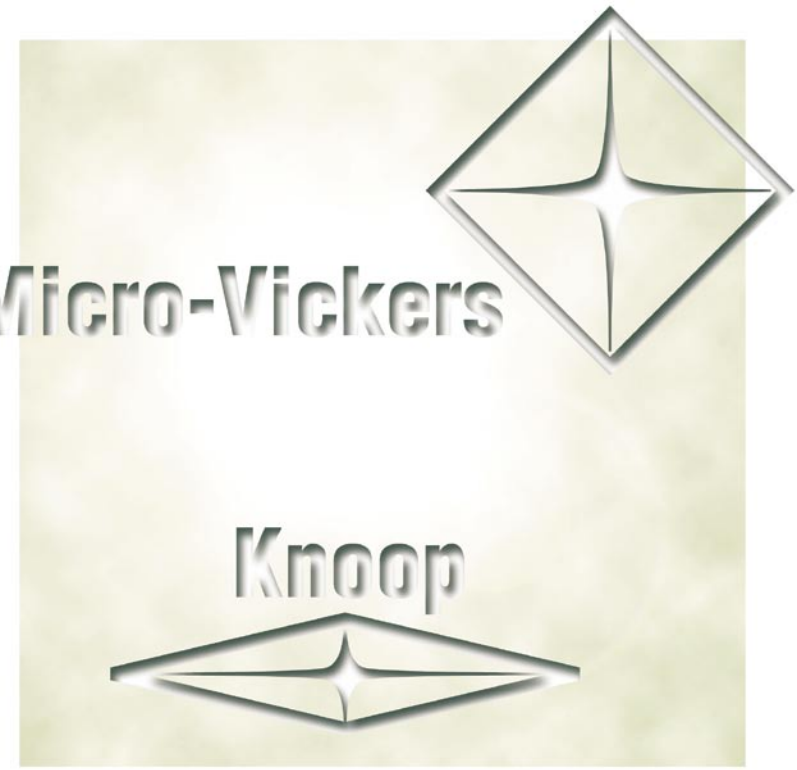
System buildup items

Order No.	Item name	Description/remarks	Quantity	810-354	810-355-1	810-356	810-357	
				Video camera unit	Auto-measuring unit	Auto-position unit	Auto-focus unit	
—	Software		1	—		—	—	
19BAA502	TV Monitor		1	√	—	—	—	
*1	Power cable set		1	*1	—	—	—	
—	Monitor adapter		1	√	—	—	—	
19BAA358	CCD camera	1/3 inch, Monochrome camera	1	√	√	—	—	
—	Camera cable		1	√	√	—	—	
19BAA361	CCD-PC connecting cable	For connecting the main unit and frame grabber	1	—	√	—	—	
19BAA359	Camera adapter		1	—	√	—	—	
19BAC233	Frame grabber		1	—	√	—	—	
19BAA376	PC-AT driver unit		1	—	—	√	—	
11BAB908	Fuse	For 100-120V AC, 250V AC 2A (one unit installed)	2	—	—	√	—	
218001	Fuse	For 220-240V AC, 250V AC 1A (one unit installed)	2	—	—	√	—	
*1	Power cable set		1	—	—	√	—	
19BAA379	Motor control board		1	—	—	√	—	
19BAA381	AT-PPCI dedicated cable	Connecting the PC-AT driver unit and motor control board	1	—	—	√	—	
19BAA380	Digital I/O cable		1	—	—	√	—	
19BAA382	AT-DIO dedicated cable	Connecting the PC-AT driver unit and digital I/O board	1	—	—	√	—	
19BAA377	Automatic XY stage	5-phase stepping motor specification	1	—	—	√	—	
19BAA378	Automatic XY stage cable	Connecting the Automatic XY stage and PC-AT driver unit	1	—	—	√	—	
19BAA402	AF auto-stage (for HM)		1	—	—	—	√	
19BAA404	AF auto-stage cable		1	—	—	—	√	
11AAA796	Joystick controller		1	—	—	—	√	
11BAC337	Joystick board		1	—	—	—	—	
11AAA826	Lens tube (focus pattern)	Illuminator tube unit needed for auto focusing.	1	—	—	—	—	
19BAA362	HT-PC dedicated cable	Connecting the main unit and the dedicated personal computer, 2m	1	—		—		
19BAA360	Camera power unit		1	—	—	—	—	*2

*1 vary with the destination.

*2 is needed for the exclusive use of the video camera unit or Auto-measuring unit when both are mounted.

Note: Mitutoyo products are included in appendix 1 of "Export Administration Regulations" and accordingly, an export license may be required when exporting.



- Coordinate Measuring Machines
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- Sensor Systems
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